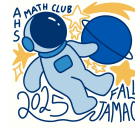


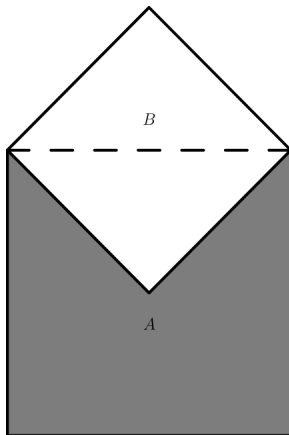
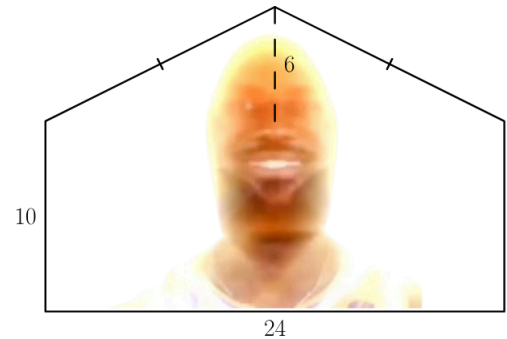
# Geometry Round

20 minutes | 12 problems



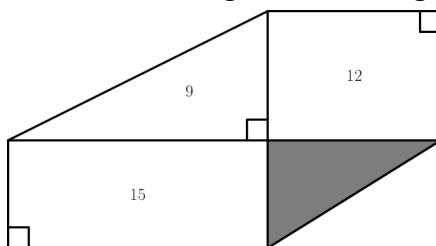
1. A few scientists are tasked with creating a simple protective triangle charm to avoid a powerful alien species. To make it work, they need to form Triangle XYZ, where angle X is  $40^\circ$  and angle Y is  $60^\circ$ . What's the measure of angle Z?
2. A quadrilateral-shaped wormhole opens in front of Cooper as he flies past Saturn. It has angles measuring  $q^\circ$ ,  $4q + 12^\circ$ ,  $3q + 21^\circ$ , and  $7q + 48^\circ$ . What is the largest angle of the wormhole, in degrees?
3. The planet Jyrox is currently located at position (3,9) as it orbits its sun, which is located at (2,20). The distance between the two can be expressed as  $\sqrt{a}$ . What is  $a$ ?

4. A new rocket startup has recently developed a spaceship that will be launched into the sun. Seeing as he is the sunshine of our world, LeBron James decides to invest his entire billion dollar fortune into the venture. That startup decides to honor our glorious king by plastering him all over their logo, shown to the right. What is the total area of this logo?



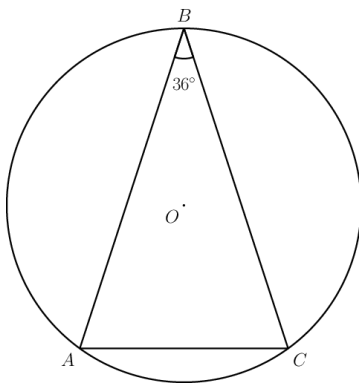
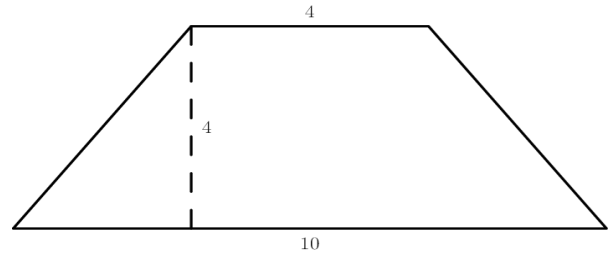
5. John is on the moon. He has discovered a remnant from an earlier Apollo mission, shown to the left. Given that A and B are both squares, what fraction of the total area does the shaded region take up?

6. A blueprint from Ronnie's spaceship calls for two rectangles and two right triangles, with most of the areas given in the diagram below. What is the area of the shaded triangle?



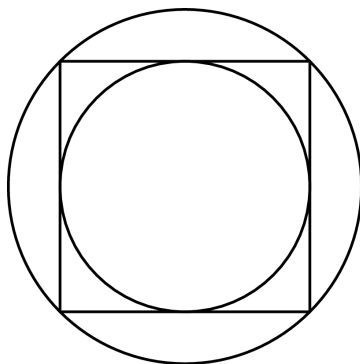
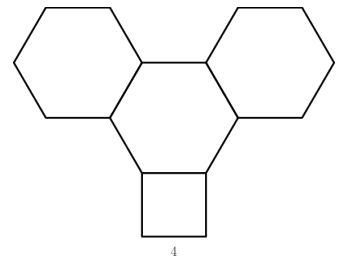
7. While sifting through the data coming from an alien outpost, Sally notices that in triangle  $ABC$ , the angles  $\angle A$ ,  $\angle B$ ,  $\angle C$  form an arithmetic sequence. If  $\angle A = 29^\circ$ , then what is  $\angle C$ ? (No diagram accompanies this question.)

8. Emma sees three congruent trapezoids with these measurements, shown on the right. Suddenly, they rearrange themselves into an equilateral triangle-shaped portal leading to another dimension. What is the perimeter of this new portal?

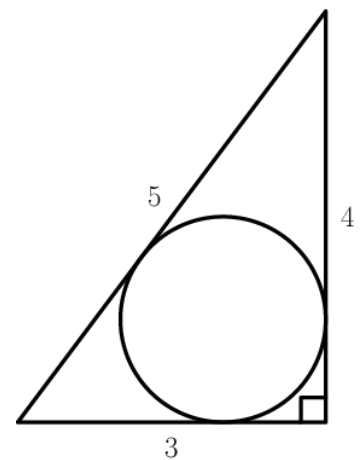


9. Robert finds triangle  $ABC$  (diagram to the left) inscribed inside of circle  $O$  as he explores the debris left behind by the Mars Climate Orbiter. Sides  $AB$  and  $BC$  have equal lengths and  $\angle ABC$  equals  $36^\circ$ . What is the measure of angle  $\angle BOC$ ?

10. Theo works at NASA and has designed a spatial telescope mirror, shown to the right. The side length of the square at the bottom is 4. The total area of the mirror can be expressed in the form of  $a + b\sqrt{3}$ . What is  $a + b$ ?



11. Thomas is building a hyperspeed cannon to shoot his spacecraft deep into an unknown galaxy. A cross-section of the cannon is shown in the diagram to the left. If the area of the inner circle is  $\pi$ , what is the area of the larger circle?



12. After being stranded on Mars again, Mark Watney searches through his dwindling supplies and finds a right triangular cracker. He decides to put the last remaining piece of cheese he has on top of it, creating the combination shown below. What is the area of his circle of cheese?